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No. 2.



The Forester,

An Illustrated Monthly Journal of Forestry



Official Organ of the New Jersey Forestry Association.



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John Gifford, Editor and Publisher,

Princeton, New Jersey.

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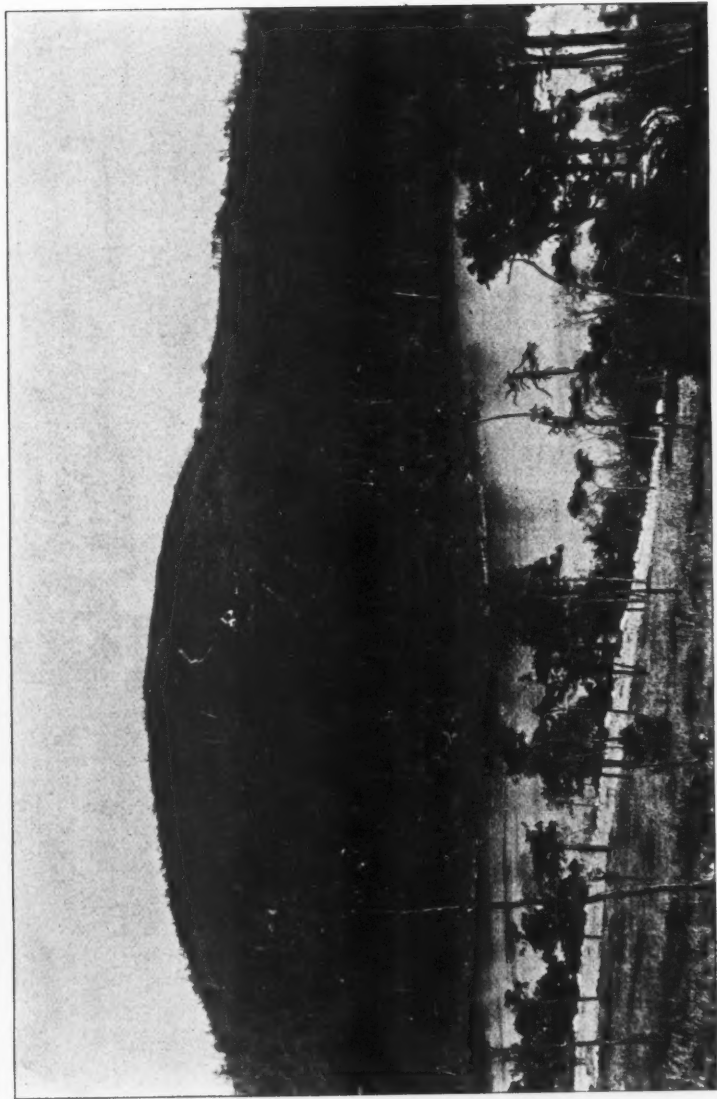
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HIGH POINT, KITTATINNY MOUNTAIN, NEW JERSEY.

LOANED BY GEOLOGICAL SURVEY OF NEW JERSEY.

(See Editorial)

THE FORESTER.

VOLUME III.

FEBRUARY 1, 1897.

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THE FORESTER.

An Illustrated Monthly Journal of Forestry.

Official Organ of the New Jersey Forestry Association, to the members of which it is sent free of charge.

THE FORESTER contains articles pertaining to all branches of Forestry: The Prevention and Extinguishment of Forest Fires, Improved Methods of Cutting, Useful and Injurious Insects and Fungi, Useful Birds, the Establishment of City Forests, State and Federal Reservations, Water Supply, Forest Legislation, Forest Influences, Forest Utilization, Forest Products, Road Construction, Reclamation of Waste Lands, etc., etc.

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Edited by JOHN GIFFORD, Princeton, N. J.,

Assisted by NEWLIN WILLIAMS and others.

THE annual report for 1895 of the Division of Forestry of the Pennsylvania Department of Agriculture has recently appeared. It is in every way an excellent work, worthy more than passing notice, and will be referred to more or less in other issues of this journal during the year. One point which is dwelt upon in this book, and which cannot be too strongly emphasized, is the need of the State of Pennsylvania, or, in fact, any State, purchasing and properly attending to those areas which, having been stripped of their timber, are now waste land and not only unproductive property, but a source of floods as well.

It is imperative that such lands become State property, otherwise they will deteriorate until even the hope of forests vanishes. Even in Germany, the home of forestry, where the significance of the subject is bred into every citizen, it requires constant attention to keep individuals from overstepping their rights in reference to the forest. In the regions where the most scientific methods are in

operation, where plans have been arranged which extend far beyond this and the coming generation, the State has found it necessary to purchase absolute control. In Dr. Rothrock's opinion, Pike county is an excellent place for a State Reserve.

Just across the river in New Jersey there is the Kittatinny Mountain region, which should be purchased by the State of New Jersey for the same purpose. The frontispiece of this issue shows the nature of the highest part of this ridge. Fires sweep over it every year, so that little vegetal covering is left except a few gnarled pitch pines and brush. There seems to be a worthy rivalry between New York and Pennsylvania in reference to forest protection. Both Governors have expressed themselves in forcible language in their messages. New York is ahead of Pennsylvania, however, in that she already owns large areas of forest. New Jersey, although she can best afford it and is most in need of it, has done the least. New York, Pennsylvania and New Jersey will be equally benefited in protecting the headwaters of the Delaware, and each should do its share in the purchase of land in that region.

The Old World has suffered enough from the reckless destruction of forests. One good lesson of that kind ought be sufficient for the civilized parts of the whole world.

In one of the trenchant editorials in *Garden and Forest* were the following re-

marks: "It is unpleasant to be constantly sounding alarms and predicting calamities. No gift of prophecy is needed to foretell the ruin which will follow if the devastation of the forests of the Appalachian region from Quebec to Alabama goes on for the next twenty-five years as it has done. And who can estimate the destruction which will ensue if the floods are let loose from the still loftier ranges which feed the Columbia, the Sacramento or the San Joaquin, or who can imagine the extent of the inland sea that will roll over the Mississippi Valley when the water barriers are removed from the eastern slopes of the great Continental Divide and the sources of that immense water system in the central north? *Common prudence ought to arouse the Legislatures of the various States and of the nation to face this problem now, which is of more vital importance to the life of the republic than any question of tariff or of currency.*"

Eads, after completing the Mississippi jetties, remarked that they had been working at the wrong end of the river.

No man has worked more diligently and conscientiously than Dr. Rothrock. Secretary Morton once remarked that he had done more to show the effects of fire and flood than any other man in America. He has pushed ahead in spite of difficulties, and is in a fair way, we believe, to do much for his native State. What has been accomplished in Pennsylvania is due mainly to his energy and ability. We hope that other States may be spurred on by what New York and Pennsylvania have already accomplished, especially New Jersey, which is sorely in need of a stimulus of some kind, although sandwiched between such active forestry centres. Perhaps the time is coming when New York, Pennsylvania and New Jersey

will protect the forests of the headwaters of the Delaware by purchasing and foresting the bare mountain tops in the neighborhood.

Constitutions of the Principal Forestry Associations of Europe.

II.

* CONSTITUTION OF THE DUTCH HEATH SOCIETY.

CHAPTER I.

AIM AND SCOPE OF WORK.

ARTICLE I.

The object proposed by the Dutch Heath Society is to encourage the reclamation of heath lands, dunes and other waste places in Holland.

ARTICLE II.

In order to accomplish this object it proposes to give advice; furnish information concerning planting; furnish estimates and working plans for reclamation; to execute schemes of reclamation at the expense of owners; lend gratis desirable and little known implements; establish nurseries and sell plants and seeds at cost price; to train experts in the department of timber culture; publish a periodical dedicated to the importance of planting for timber culture and distribute literature which has reference to planting

* It is encouraging to those interested in similar societies in America to know that the Heide Maatschappij and the similar society in Denmark, after which it was modeled, have been successful in many respects. It is also gratifying to learn that even in Europe a great deal of what has been accomplished is due to societies similar to the State associations of the United States. It has a membership of two thousand and has already accomplished a great deal. It has induced the government to continue the work of foresting the dunes, for which twenty thousand guilden have been already appropriated for experimental purposes. The work is under the direction of the society. Two nurseries have been formed in which many seedlings for dune planting are grown. This association has induced individuals to improve their waste lands, and contemplates buying and improving heath lands for example sake. The society is under the directorship of Mr. H. J. Lovink, an able and enthusiastic forester.

The New Jersey Forestry Association and other associations in America make the fatal mistake of introducing extraneous matter which in no way pertains to forestry, so that they are apt to amount to little more than general improvement societies. Those persons who would like to know more of the subject and the very persons who would be most influential in accomplishing that which is needed in reference to our forests are at once repelled by the apparent lack of practical aims and accomplishments. The New York State Forestry Association is dead, and such will be the fate of other associations unless they are built on solid foundations and make themselves known by accomplishing something of a tangible nature.

for profit; to offer suggestions which may incite private individuals and communities to plant their heath lands, and where desirable, to encourage the establishment of companies for planting waste places; if means are available, and the circumstances render desirable the starting of small plantings, the Society may undertake them, rather, however, for example's sake, since plantings on a large scale will not be undertaken by the Society; to undertake investigations as to condition of waste lands in Holland.

ARTICLE III.

Giving of advice shall be, as a rule, gratuitous; for making estimates, working plans, etc., if the Executive Board deems it necessary, a small sum will be charged, where, however, the planting takes place under the direct supervision of an officer of the Society, the compensation and expenses shall be paid by the party concerned.

CHAPTER II.

MEMBERSHIP.

ARTICLE IV.

Members shall be accepted by the Council or by the Sections. The yearly contribution of members shall be two florins. Yearly payment of ten florins or more constitutes a patron.

ARTICLE V.

Those who, in respect to the aims of the Society, have distinguished themselves in any way may be elected honorary members by the General Assembly.

The Council shall have the authority to elect foreign corresponding members. Honorary and corresponding members shall have the same rights as common members; they pay no dues.

ARTICLE VI.

The Society's year shall be computed from January 1 to December 31.

ARTICLE VII.

Members shall receive gratis a copy of the Constitution, and as far as the means of the Society permits, the ordinary publications issued in its interests. Extra publications can be obtained by members at cost price. Patrons will receive gratis all publications of the Society.

CHAPTER III.

THE ADMINISTRATION.

ARTICLE VIII.

The Society shall be governed by a Council composed of twenty directors who shall be chosen by the General Assembly, for a period of five years; each year four of the directors retire in rotation, the retiring directors being immediately reëligible.

Every Province which has at least twenty members shall be represented, if possible, by at least one member of Council.

ARTICLE IX.

The Council shall choose from its numbers a President, Vice-President and a committee of three members which together form the Executive Board. The Director of the Society assumes the duties of secretary unless the Council deems necessary to appoint a special secretary.

ARTICLE X.

The Council undertakes to see that the Society fulfils its purposes as far as possible; makes up every year a budget of estimates, compiled with the aid of the Executive Board and the Director, and prepares a report and account of the year's outlay and business for the General Assembly.

ARTICLE XI.

The Executive Board represents the Society in its foreign relations, and lays out a plan of work for the Director.

ARTICLE XII.

If conditions make it desirable, the Council may appoint from its midst sub-committees in order to look after the interests of the Society in special provinces or districts.

ARTICLE XIII.

All resolutions of the Council and of the Executive Board shall be adopted by vote of the majority; resolutions referring to persons by secret ballot; those referring to other matters verbally.

ARTICLE XIV.

Members of Council may be reimbursed (if they exact it) for traveling and board at the meetings of Council and General

Assembly, and for all traveling expenses in behalf of the Society.

CHAPTER IV.

SECTIONS AND CORRESPONDENCE CLUBS.

ARTICLE XV.

Where at least twenty members are secured a section may be formed. Members in adjoining communities can establish a section.

ARTICLE XVI.

Where less than twenty members exist correspondence clubs may be formed.

ARTICLE XVII.

Members of a section choose a President, Vice-President and Secretary-Treasurer. Sections may, if they wish, establish their own local management; they can offer resolutions at the Council or General Assembly.

ARTICLE XVIII.

The sections shall look after the payment of contributions and send the dues to the Director of the Society before February 1. The secretaries of the sections shall furnish to the Director the number and names of members of the section at least fourteen days before the General Assembly. To defray any expenses of local management the sections may raise contributions from their members over and above the Society Membership dues.

CHAPTER V.

THE DIRECTOR AND OTHER OFFICERS.

ARTICLE XIX.

The business and undertakings mentioned in Article II shall be under the charge of a Director, aided by the necessary number of assistants. The Director shall have his office in a location specified by the Council. He shall conduct the correspondence and money matters according to stipulated regulations.

ARTICLE XX.

The Director shall be appointed by the Council upon a proposition of the Executive Board, and reappointed every five years. The Executive Board may suspend the Director, and within three months the Council shall render decision. The appointing of all officials who draw a higher salary than 300 florins shall be

made by the Executive Board, with approval of the Director; other officials shall be appointed and dismissed by the Director.

ARTICLE XXI.

The Director and the other officials are subordinate to the Council.

ARTICLE XXII.

The Director shall furnish each year, in the month of September, an estimate for the following year, which the Council shall endorse before the end of the current year.

ARTICLE XXIII.

The Director shall make each year a report of all business of preceding year, and send this, with all accompanying documents and vouchers, before May 1, to the Council.

ARTICLE XXIV.

The Director shall have a salary fixed by the General Assembly, upon advice of the Council.

ARTICLE XXV.

The Director, over and above his salary, shall be paid cost of traveling and board for all journeys in the service of the Society, to be regulated by order of the Council.

CHAPTER VI.

THE GENERAL ASSEMBLY.

ARTICLE XXVI.

The Council shall call a General Assembly at least once a year, for approval of accounts and reports, for electing members of Council, and for discussion of the Society's affairs and those of the sections, and of the propositions which may be presented by the sections.

ARTICLE XXVII.

The General Assembly shall consist of delegates to the sections, and of all members and patrons of the Society. The delegates vote according to number of members in their sections, every twenty members giving the right to one vote; one delegate, however, shall not be allowed more than six votes.

ARTICLE XXVIII.

The place and time for meeting of the General Assembly shall be determined

by the Council, who shall announce the subjects to be considered, at least one month previous, to the sections and correspondence clubs.

ARTICLE XXIX.

The General Assembly decisions shall be reached by absolute majority of votes. In personal matters ballots are taken; in other matters, verbal votes.

The Council designates the manner in which the vote by ballot shall be taken, so that secrecy of the ballot shall be preserved. In case of a tie, the President shall have a deciding vote.

ARTICLE XXX.

At the General Assembly, after the reports and accounts are disposed of, the Secretary or Director shall give an account of the condition and business of the Society for the year past.

ARTICLE XXXI.

Propositions which the sections wish to have considered by the General Assembly must be handed to the Director at least six weeks previous. The Council may determine whether subjects foreign to the order of the day's programme shall be considered by the General Assembly.

CHAPTER VII.

GENERAL RULES.

ARTICLE XXXII.

The seat of the society shall be established at Arnhem.

ARTICLE XXXIII.

The Society shall be established for the term of twenty-nine successive years, counting from the day when for the first time Royal approval of the constitution was granted.

ARTICLE XXXIV.

No change in the Constitution shall occur except by decision of the General Assembly, and proposal of a change must be duly announced in the call for a meeting.

ARTICLE XXXV.

Any modification or new article shall only go in operation after obtaining Royal approval.

ARTICLE XXXVI.

The Society can only be dissolved by a decision of the General Assembly after such proposal has been duly announced. In expending money and in the use of the Society's possessions the General Assembly shall have a decisive voice. In every case a decision shall be given which, as far as possible, carries out the aim of the Society.

Adopted at Arnhem 24th June, 1888, and approved by Royal decree 9th Aug., 1888.

Extracts from a Paper by Capt. Charles Mellvaine, on "Fungi, Beneficial and Injurious to Forest Growth," at the Meeting of the New Jersey Forestry Association in Trenton, Jan. 5, 1897.

"For fifteen years toadstools have been my very best friends. I not only love them; I have devoured them—457 species, and many meals of each species."

"The fungoid growth of our forests is to the forest debris and soil what Darwin has so exhaustively shown the common earthworm to be to fallow and farmed lands. Toadstools are rapid converters of effete matter into that which succors living tissues. They are surgeons alike to saplings and forest Titan. They are scavengers more active and ubiquitous than the house fly, and those from which our city cleaners may well take example. They are cultivators and fertilizers of the forest soil—the farmers of the woods."

"Upon forest timber various causes furnish good habitats for fungoid growth. Insects and birds by wounding the bark or leaves—boring or cutting into the vital parts—lightning by its burning and shattering, wind by its twisting and bending, hail by sharp pelting, limb contact and falling branches by their bruises, too much or too little moisture, lack of tree nourishment, all contribute largely resting and germinating places for fungus spores. Wherever a tree is wounded the cells are broken, devitalized. Decay begins. The tree, if healthy, makes effort to heal the wound. It could not do it if the disorganized mass remained intact. The minute fungoid spores come to its assistance. They germinate, throw their mycelium into the wounded tissue, and

by its rapid growth disintegrate the particles, convert their substance into fertilizing compounds, eat away the dead branch and drop it to the ground, or clear away the bole that healthy growth may form. Look at any dead branch and you will find fungi of many species fitting its substance to be used again in some form of plant life."

"When trees reach their prime, or when they are smothered by surrounding growth, their decline begins, as nature intended it should. It is then, and then only, as far as my experience goes, that the mycelia penetrate the diseased mass and finish the destruction already begun."

"It is upon the forest mat that fungoid growth does its greatest beneficial work. The annual fall of leaves is immense, and this is greatly increased by the dropping of trunks, limbs and branches. What would become of it? From whence would the forest growth obtain its nourishment if the millions of fungoid forms did not disintegrate it and fit it for the rootlets to absorb?"

Third Annual Meeting of the New Jersey Forestry Association.

The third annual meeting of the New Jersey Forestry Association was held in the State House, Trenton, January 5th, 1897. Owing to the death of Hon. Aug. Cutler, Mrs. J. C. S. Davis, Vice-President, presided. Minutes of the Plainfield meeting were read and approved. The Secretary-Treasurer reported a small balance in the treasury, and that little had been done during the year, owing to his absence in Europe. The following officers were elected: President, Mrs. J. C. S. Davis; Vice-Presidents, Captain A. M. Bradshaw, Francis B. Lee and Jules Girtanner; Secretary, John Gifford; Executive Committee, Franklin Dye, John Hall, Lebbeus B. Ward and Miss Susan Lippincott.

Mrs. J. C. S. Davis, Francis B. Lee and John Gifford were appointed a Committee on Legislation.

The following resolution was passed:

Resolved, That in the death of the Hon. Aug. Cutler, of Morristown, third President of this Association, we have lost a

valuable member and an efficient presiding officer, who contributed by his earnestness and experience very largely to the prosperity of the Association. While deploring his departure from us, we bow with submission to the Divine will, believing that the influence of our departed member will continue in his absence.

Capt. Chas. McIlvaine read an interesting and instructive paper on "Fungi, Beneficial and Injurious to Forest Growth." Extracts from this paper are printed on another page. In the evening an illustrated lecture of extraordinary force and value was delivered by Mr. B. E. Fernow, Chief of the Division of Forestry, Washington, D. C. This lecture is printed on another page. It will be reprinted in brochure form, and may be had free of charge on application.

Danger of a Rubber Famine.

It is stated that only within the last year has there been any attempt to regulate the gathering of caoutchouc and to stop the wanton destruction of the tree, which it seems is usually cut down, so as to facilitate the collecting of the sap. This puts an end to the productiveness of whole districts every year; and, as it has been found that by properly made incisions about two pounds of rubber can be gathered from each tree annually, without in any way interfering with its growth or life, vigorous attempts are called for, and it is stated are being made, to regulate the treatment of the trees. Owing to the danger of a rubber famine, several chemists, in both France and Germany, have been working on methods for the artificial production of India rubber, and several new processes have already been announced.—*Popular Science Monthly*.

The West may outstrip the East in the way of reforms in spite of the fact that it is comparatively new. The Forestry Association and Washington Lumber Exchange met together in Seattle on the 8th of January. There is room for hope when the lion and lamb lie down together.

Minor Forest Products.

I—MAPLE SAP.

Pioneers of the American wilderness learned from the Indian of a sugar-tree that grew by the northern streams and on the mountain sides. They saw him gash and score the bark, and collect the flowing sap after some primitive method of his own. The paleface set his wits to work to improve on the red man's plan, and he has done it.

In earlier days the New Englander scored a quadrangle or wedge in the bark of the tree, one corner of the figure always being made to point earthward. Into this dependent angle the sap from the wound naturally gravitated, and to catch it a channelled instrument of iron was driven into the tree just below the point where the sap collected. The fluid was thus led from the gash into a trough hollowed boat-wise out of a basswood log. The boiling was done in the midst of the woods in a large iron pot, hung on a rude crane over a fire of green wood, cut as it was needed from the forest. Only an impure dark syrup could be had from such a crude process, exposed as it was to falling bark and cinders and to the harmful dilution of storms. The New England mind soon began to experiment upon methods of procedure, and one after one new points were evolved. A shed or cabin was built to protect the boiling syrup and the farmers through their hours of watching; a brick fireplace and chimney were substituted for the wasteful open fire, and the sap was strained and kept covered until the boiling.

Of late years methodical experiments have introduced so many improvements and economies into the process that it is well nigh revolutionized.

At the bottom of this, and, of course, all processes, lies the sugar tree,—the sugar maple, *Acer barbatum* of the botanists, a species peculiar to North America. In the forest it grows to be a large, tall tree with ascending branches, but, given space, as in the open, it has but a short trunk, begins to branch low down, and the branches spread, forming a compact rounded head, gray in winter and in summer covered with that dense dark

green foliage which makes it so much sought after for the lawn and the avenue. The tree reaches its highest perfection in the region of the great lakes and north-eastward. Indeed, it is from the States of this region that practically our whole market is supplied with maple sugar and syrup.

Vermont is the banner State, producing over 14,000,000 pounds of sugar in 1889, having an average value of 7 7-10 cents per pound; and in the same year 218,000 gallons of syrup, having an average value of 76½ cents per gallon. New York follows in the matter of production with 10,000,000 pounds of sugar. New Hampshire, Pennsylvania, Michigan and Ohio come next with between one and three million pounds each. Massachusetts makes half a million pounds; all the other States falling much below even this last figure. Vermont is the only State showing an increase in production over 1889. This is probably due in part to the preference of a market limited by the low price of cane sugar for the admittedly superior article from the Vermont orchards, and also in part to the said low price of cane sugar discouraging smaller operators from the production of a more or less inferior article either for an uncertain market or for home consumption.

The most favorable site for a sugar orchard, or "bush," as it is called, is on poor, but well-drained soil, on some south or southeast slope, watered by running streams. The orchard is kept free from undergrowth, evergreens and birches, and the maples themselves are not allowed to crowd each other. Experiment and observation have shown a marked advantage from growing trees under these conditions.

The sap begins to flow some time in March, usually in the second or third week, but varying with the particular season. It continues to flow until the buds swell and burst and spring advances in earnest, which period at the latitude of the sugar lands occurs about the middle or last of April. The sap is richest and makes the finest sugar during the "middle run," or the period either side

of the first of April. In the "early run" the sap is watery and contains a low percentage of saccharose, and in the late run also a lower percentage of saccharose, besides which drawback the plant organism begins to manufacture glucose and other materials which carbonize at a comparatively low temperature, and thus injure the quality of the syrup during the later stages of evaporation.

Experiment has overthrown the old theory that sacchariferous sap flows only from shallow bores, or from the newer layers of wood, for it is now established that a richer and more abundant flow may be obtained without apparent injury to the tree by tapping with a small ($\frac{3}{8}$ to $\frac{5}{8}$ inch) auger, as deep as $2\frac{1}{2}$ to 4 inches, directly toward the heart wood. The bore is generally made toward the south side of the tree early in March, anticipating the early run by a day or so. Metal taps are inserted and covered tin pails hung beneath them. When the midday sun shines on the twigs a lively bleeding goes on all through the bush, at the rate of about an ounce per tree every three or four minutes. The pails are emptied in the cool of early morning into storing vessels of metal or painted wood, until sufficient sap has been collected to begin the evaporation.

The average fully grown maple will yield, with one tapping, in a season fifteen to forty gallons of sap, equivalent to two to six pounds of sugar, and this year after year without apparent loss of vitality except that naturally consequent upon age and decay. Exceptional trees are not rare, and one author records a case in which an especially prolific one was made to yield fifty pounds of sugar in a single season, but at the cost of its life.

In its concentrated state a fair sap averages from $2\frac{1}{2}$ to 4 per cent. of saccharose or pure sugar, and yields 2 to 4 ounces of sugar to the gallon.

In transferring the sap from one receptacle into another no opportunity for straining is lost, since each cinder or particle of bark contributes its share toward darkening the boiling syrup.

Modern makers work altogether under shelter. They employ a chimneyed brick fireplace, over which is set a long, shallow sheet-iron pan, divided into several compartments, communicating with each other by small orifices, and the pan having corrugations where feasible, to increase the evaporating surface.

The reservoir of collected sap is placed over one end of the long pan and enough sap is allowed to flow from its tap to cover the bottom of the pan with a thin layer. The stop-cock is then partially closed, allowing a mere trickle to supply the loss by evaporation. The fire is now applied. The advantages of the modern pan are: A superior product; gain in time, this factor being reduced from sixteen or twenty-hour period of the iron-pot method to a four or six-hour period for the same quantity of sap; and when evaporating tubes are used, and, as may be seen in the most extensive orchards, the time required is even brought to two hours for reducing 200 gallons of sap to syrup; The maintenance of several portions of sap at different degrees of concentration enables the operator to draw off finished portions of syrup from the division at the greatest distance from the trickling tap without fresh sap being added to the already concentrated syrup, the necessity of so doing always adds to the danger of precipitation of the so-called "nitre," which results at a certain stage of the heating from the combination of the calcium salt with the malic acid, both native constituents of the sap. If this calcium malate should be precipitated to any extent, the pan has to be removed and cleaned in order to avoid scorching.

The thermometer is constantly used by large makers during evaporation. When the most concentrated portion of the syrup reaches 219° Fahr., above which point it is liable to granulate on cooling, it is run off and allowed to stand, when the "nitre" is precipitated. When cool it is strained into receptacles for use or for the market. The syrup at this point weighs 11 pounds to the gallon, and contains 50 to 70 per cent. of saccharose.

If sugar is to be made, the syrup, freed

from "nitre," is further concentrated until it reaches a granulating point. The degree to which this may be carried depends on the quality of the sap. If the syrup is fine the mass may reach 240° , representing about 90 per cent. of saccharose, and the resulting product cools, after stirring into a firm hard cake. However, if the still thick syrup for any reason cannot be carried to 240° , the pan must be removed from the fire and the sugaring finished. The product in this case is known as "tub sugar," is soft, dark and moist, and if removed from the fire at 230° - 234° , is apt to contain between 80 per cent. and 90 per cent. of saccharose. Stirring, in either case, is best continued until the sugar is a stiffening granular mass, but which will still run readily. The stirring allows the escape of steam from the heated mass, and at once enhances the firmness of the sugar through loss of additional water and raises the percentage of saccharose.

A home method for determining at what point the sugar should be removed for stirring and "sugaring off" consists in pouring from time to time bits of the hot mass out on the snow, which almost always persists in the maple region until sugar time. When it hardens and becomes brittle at the touch of cold it is pronounced finished.

The later wrinkles in the manufacture of maple sugar and syrup have enabled operators to produce a whiter and finer article than was possible by the old ways, but efforts toward obtaining a higher percentage of saccharose and a paler product seem to be of questionable utility, since increase in technical purity goes hand in hand with loss of the true maple flavor which has become such a favorite one in connection with certain dishes that come upon our tables.

By over-refining the sap loses more and more of the uncrystallizable elements, and with them that peculiar tang which is so pleasant to northern palates—the racy flavor of a product drawn as water from under the granite rocks and steeple-bush and roots of sweet fern, and sweetened by the vegetable cunning of the sugar tree. The taste gives a pleasure

akin to that of wild game, as venison or grouse, to that of using spontaneous bounties like meadow mushrooms or wild native fruit—like breathing the air of mountain summits and drinking at the head waters of rivers.

NEWLIN WILLIAMS.

Acknowledgement and Review of Publications Recently Received.

Familiar Trees and Their Leaves. By F. Schuyler Mathews. New York: D. Appleton & Co., 1896.

Every friend of trees will look with pleasure through Mr. Mathews' book. It is preëminently fitted for the popular study of our wild native and our foreign cultivated trees, containing, as it does, accurate drawings of the leaves, and often the fruit and blossoms, of all our important northern species, and covering a range of territory considerably south and westward, thus rendering easy the determination of the various species even without the aid of the descriptions. The brief sketches point out the salient characteristics of each tree, giving its common name or names, its botanical name according to Gray and to Sargent, and giving, apart from its botany, such facts about it as may be of interest or practical use to the general reader.

Interspersed through the work are several full page illustrations, and value is added by an introduction contributed by Professor L. H. Bailey, of Cornell University.

The main work of the book is preceded by an artificial key devised by the author as a ready guide for the identification of tree species by means of leaf-shape. Also is found a chapter which tells in a clear way of the leaf as a builder, explaining its function in vegetable life, and commenting on the various forms of leaves which occur on our forest trees.

It is one more of that growing class of books which "invite people to see and know nature," and which, in so doing, utter a good word for the forest cause, and for human health and sanity in many other ways.

ADDRESS ON FORESTRY.

Delivered by Mr. B. E. Fernow, Chief of the Division of Forestry, Washington, D. C., in the State House, Trenton, January 5, 1897.

I am asked to preach you a sermon on morality.

Mr. Gifford who sent me the invitation, will perhaps be astonished himself at my conception of his call. He will tell you that he let me know distinctly that this was to be a forestry meeting, and not a revival meeting; that he did not say anything about morals and morality, but that he wanted me to talk on forests and forestry.

So he did; but he also intimated that he would like to have me lay particular stress in my remarks on the duty of government to enforce laws against forest fires, for, he adds, "my visit to the forests of France has convinced me that it is foolish to talk of timber culture and forestry in a region of forest fires."

I have long held and argued these views, and I was glad to see that closer study has brought another reasonable man to the same view; but perhaps he does not realize the fact that this condition of affairs is due to a lack of morality, individual, civic, as well as general public morality; and that to attain a different attitude in the treatment of our forest resource we must attain first different moral conceptions among our people and our legislators as to the meaning and value of that resource and as to the rights, duties and obligations of the community.

Not only is such a change in moral conception necessary in order to secure a more honest and efficient administration of the laws that are or may be enacted, but, to secure the enactment of efficient laws, our legislators must have different conceptions of the communal interests which they represent, of the general duties and functions of the government, than seem to exist.

Statesmen, legislators and students of political economy have concerned themselves mainly with the questions of the production and distribution of artificial wealth; meanwhile the questions which pertain to the conservative and most

rational use of natural wealth have received but scanty consideration.

If any of you were asked to write an essay as to whether artificial wealth or natural wealth is of more importance to the prosperity of a nation, I am sure all would give the greatest weight to natural wealth.

Yet, while theoretically such an agreement were reached, when it comes to the practical administration and legislation on public affairs, the closest attention and the greatest importance are given to the requirements of artificial wealth production and the smallest to the judicious use of natural wealth. And yet I venture to say that whether we have a high tariff or no tariff, an income tax or a head tax, direct or indirect taxation, bimetalism or a single standard, national banks or State banks, are questions of much less moment in the end than whether fertile lands are turned into deserts, forests into waste brushland, brooks into torrents, rivers changed from means of power and intercourse into means of destruction and desolation.

These are questions which do not, as the former ones, concern only the convenience, but the very existence of the community itself; they do not concern the present only, but the future as well.

Surely, the time is coming when this truth will dawn upon our people and the need of a rational policy in the use of our resources, and of the soil especially, will present itself as the most important one; when it will appear that to leave the exploitation of these to the unrestricted competition of private enterprise, means devastation, destruction, deterioration of the natural resources, which are the foundation of society. While there is plenty, we may squander, but as population becomes more dense, every foot of ground must be placed to proper use, for what it can best produce, food or wood. That State which takes the best care of its natural resources, that makes the most of its soil, will finally outrank all others.

You may say, and many do say: Let the future take care of itself. It is just that kind of thought and talk that leads

me to consider the forestry question a moral question, a question of public morality, just as it is essentially a question of the future. Woe to the future, to the community that is to follow, to our children or children's children, where such a low conception of moral obligations exist among our legislators, where no higher ideas of the duties and functions of government prevail than those which may suffice for the individual, namely, sole interest in the present!

Individual interests are by no means identical with social interests. On the contrary, the individual works for his own immediate benefit; he gauges everything by his own limited existence, by his individual advantage, taking little heed of the consequences of his actions on the well-being or the future conditions of the community. Continuity, permanence, posterity are no realities to him in the pursuance of his objects.

Hence, since we must proceed under the assumption that the State, the community, lasts forever, it becomes necessary that the government step in and protect the communal interests, and not only the interests of the present; but of the future as well. This is the obligation, the logical function which rests upon our legislators, our officers: that they do not allow any misuse of present opportunities, that they do not permit the waste of our resources to such an extent as to make the future community pay the penalty of it.

The individualist, the man who has not yet realized that governments are finally great co-operative societies for the purpose of securing the best conditions, not for present existence only, but also for the future of society; the democrat who tries to restrict government activity to mere police functions, who denies any further right or duty of government beyond the catching of thieves and murderers, must be considered on a low plane of public morality, for he only sees the present limited horizon of selfish individual satisfaction.

Yet, even if he were only able to carry his own theory, namely, of the police function of the State, to its logical end,

he would have to admit that if it is proper for the State to interfere when open and violent attempts are made to subvert public order, this same interference should be invoked against those who insidiously undermine the very conditions of social existence and social progress, by the misuse or destruction of their property, especially when such misuse injures not only the individual itself, but many other individual and communal interests.

That we have not yet been able to protect forest property; that it seems impossible to stop the forest fires which rage in all our States, is in the main due to a low state of public or civic morality; if communal sense, or communal interest among the people, were behind the laws that are on the statute books of every State, it would not be difficult to get rid of this bug-bear.

When our people shall have not only theoretically, but practically agreed to this *providential* object of government, namely, to protect future interests against the present; when individually they have accepted it as a moral truth or tenet, that they owe a debt to the future, and must give way in part to communal interest, it will be easier not only to carry out laws, but to secure the enactment of more rational legislation, that has in view the future of the community.

I have said that the forestry question is one that concerns essentially the future, and hence is eminently one that calls for governmental consideration. To understand this we must bear in mind that forest growth is not only a material resource, supplying us with a most useful and most necessary product, without which the progress of civilization would be badly hampered, and that it is capable of ready reproduction when properly treated, but it is also a condition of the earth's surface, and as such exercises an important influence upon other conditions.

Trees grow to be cut, to supply us with wood. Forests must be leveled and removed to furnish land for food production; but there has been much senseless, nay, criminal removal of forest growth from

soils and situations which can never be profitably used for food production, where wood was the only proper crop.

The thin mountain soils, which can only be tilled with the greatest labor, and which yield only a miserable pittance of oats and potatoes in return, have been and are still unintelligently devoted to agricultural purposes; the loss to the community lies not only in the unprofitable employment of labor, but these mountain farms keep the farming population poor, and the land grows poorer and poorer until it must be abandoned, when it grows up to brambles and brush, and for many decades or centuries remains worse than useless.

No more sense is exhibited in denuding loose sands for agricultural purposes. To be sure, there is less labor needed in the tillage, and the lazy, lounging farmer of the sand barrens gets his pittance with less exertion, and if he be careful, he may continue to gather his poor crops for many years.

But his labor, too, is disproportionately rewarded, and the community loses so much labor capital in unprofitable employment, when, if kept in continuous wood production, the returns from the soil would be more adequate and the labor of more benefit. And when this sand barren farm is abandoned it remains unproductive, a waste, useless to the community, while if rationally managed for woodcrops it could have continually contributed to the wealth of the community.

If this loss of reward to the individual farmer and his family, this loss of national or State labor capital and of adequate returns from the soil were all, the loss might still be considered small and unavoidable, it might still be left to adjustment by natural laws; but such misuse of soils is usually followed by much graver consequences.

The mountain farm not only on the thin, rocky soil is deteriorated, until it fails to support the farmer, but even in the hill-lands, where the soil is deep and fertile enough, it may be lost by improper tillage and irrational treatment of the forest cover, due to erosion of the soil by

the rain waters which rush over the bared ground.

Such sights of eroded hill farms are most frequent through all the Southern States, but I dare say it would not be difficult to find illustrations in the Jersey hill-lands, although geological structure there is mostly more favorable and less liable to soil washing.

It takes infinitely hard work and patient waiting to restore the lost ground and place it again into favorable condition as it was when the foolish removal of the forest growth from the parts where it ought to have been maintained was begun.

It would have been easy to apply some rational thinking in the first place and keep under forest cover the thin soiled tops, where the water compacting the soil and thereby preventing its infiltration receives its first momentum in rushing down the hill, to keep in wood the steep hillsides were deprived of the forest floor, it is bound to loosen the soil and rock, gully the ground and carrying it into the valley and covering up fields and fertile soils with debris.

But it is not only the present loss to the present owner that is to be considered; not only the deterioration and loss of taxable property from which the community suffers; but like a malignant disease, the trouble spreads and finally what was a simple sore has grown to be an inflammation of the whole body. The soil and debris washed into the rivers, and the rainwaters rushing into them over the bared slopes give rise to excessive floods and overflows, and the community is called upon to give relief to flood sufferers, to pay river and harbor bills and build dikes, etc.

Manufacturing enterprises which relied on an even supply of water power are crippled, and finally the community, after bearing expenditures on river improvements, must tax itself to correct the evil at the headwaters. Perhaps not the present community, but surely a future community must pay the bills, because we failed in our moral obligations at the proper time, because we are repudiators of our duties.

We are not yet old enough, not yet

densely enough populated, to feel the results of such mismanagement of our soils; there is still enough elbow room, that permits us to abandon waste places and seek virgin soils. Yet with the increase of population the same disastrous experiences are in store for us as have been had in older, more densely populated countries.

Although in New Jersey you are not favored with high mountain ranges, I will nevertheless bring before you the experience which France has had, only during the last century, because these experiences will repeat themselves in our country and in our State, if not in the same manner, yet in general character. *

* * *

In Jersey the high elevations are absent, and hence there is less danger from torrential action. Perhaps the hill-lands, being mostly covered by deciduous growth, which has a remarkable capacity for recuperation, have not suffered as yet, and may not suffer to the extent as other parts of the country; your losses lie mainly in another direction. * * * *

When it first dawned upon some more observant minds that the extensive denudation of slopes and sands was a dangerous proceeding, and gave rise to large loss of property and unfavorable conditions, the cry arose to stop the men who were cutting the forest.

No more short-sighted methods of arresting the evil could be proposed, even if it were practicable.

These good people, who sentimentally performed in various keys and on all sorts of instruments the old song, "Woodman, spare that tree," evidently had never realized that trees and forests grow to be cut, that without wood our civilization would be entirely impossible; that the lumberman is an absolutely indispensable purveyor of a material which, next to food, is of the highest importance; that our civilization is built on wood, that from the cradle to the coffin it accompanies us.

Hence trees must be cut and hauled to the mill, and will be cut and sawed into lumber as long as any are to be had, to supply our needs. There are few people

who realize how dependent we are on wood, and what enormous quantities of wood material we consume. It enters into nearly all our structures as an essential part; over half our people live in wooden houses; it serves to ornament our homes, to furnish them with conveniences, to warm them, to cook our food; more than two-thirds of our people use wood as fuel.

Until recent times it was the only or principal means of melting the ores and shaping the metals with which to fashion the wood itself. For every 100 tons of coal mined two tons of mining timber are needed.

There is hardly a utensil, a tool or even a machine in the construction of which wood has not played a part, were it only to furnish the handle or the mold or pattern.

For our means of transportation we rely mainly on wood. Our 180,000 miles of railroad lie on not less than 80,000,000 wooden ties, and run over 2,000 miles of wooden trestles and bridges; they carry their freight in many million wooden cars and much of the millions of tons of freight is shipped in wooden boxes, stored in wooden sheds.

Ten million telegraph poles are needed to keep up communication between distant markets.

Hundreds of thousands of tons of wood pulp is used in the manufacture of paper.

The forest furnishes the cooperage to market our vintage, to store our flour and fruit. The forest furnishes the plow-handle and harrow frame to cultivate, the threshing machine and windmill to prepare the crops, the cart to bring them to market, the bottoms in which they cross the ocean to foreign marts, and even the tar and pitch to keep the cargo safe.

One billion dollars worth of forest products is what we annually consume in the United States, but little less than one-half of the value of our entire agricultural production, and nearly twice as much as all our mines, quarries, petroleum wells and mineral production of any kind put together, and more than ten times the value of our gold and silver

mines, over the fate of which the country nearly came to a revolution.

It is then folly to talk of stopping the lumberman.

It is, then, not by stopping the use of our forest resources that we can prevent the evils which may come from denudation of certain soils and of slopes, but by rational use and management of the same, by stopping the unnecessary waste and uselessly destructive practices.

It is not necessary to cut as wastefully as we have done hitherto. The times when log-rolling bees, to get rid of the growth which encumbered agricultural soils, were necessary, has gone from most sections of the country.

If the lumber business were carried on rationally it would not be necessary to make an unsightly waste with the debris left by the lumbering operation, which is bound sooner or later to furnish food for the flames; these fires destroy not only all young aftergrowth, but the vegetable mould as well, and, repeated again and again, turn into wastes what should have been a continued source of wood crops.

Whatever blame may attach to the lumberman for wasteful methods, which are often necessitated by the close competition under which he has had to work and by the economic conditions which have required the opening up of distant forest areas, from which only the better sizes and qualities could be transported profitably—whatever blame may attach to him, the fire fiend has done infinitely more harm than the ax, and the first attention that is required of your legislators is to reduce this evil.

Jersey has long been lumbered out; there are a few sawmills and shingle mills doing a small local business, supplied from the casual young aftergrowth of the State, and the few remnants of virgin growth; but its quota to the great lumber market of the country, which consumes 40,000,000 lumber feet of material, is practically nil; and yet there are not less than $2\frac{3}{4}$ million acres of land, or about 60 per cent. of the total land area fit for nothing but wood crops.

This area, one-third of which in the hill country of the northwestern section, two-

thirds in the sand barrens of the southeastern section, situated as it is near active places of consumption, could under only indifferent care produce at least 100,000,000 cubic feet of wood every year forever, with an annual stumpage value of at least \$1,000,000.

At present the citizens of New Jersey send at least 12,000,000 dollars out of the State for their lumber, from two to three million of which could be kept in the State, giving rise to manufactures and sawmill establishments, if the absolute forest soil, fit for wood crops only, were doing its duty. Instead, the largest part of this area is almost entirely unproductive, and its capacity for production is from year to year decreased by the recurring forest fires which, like a natural phenomenon, with considerable regularity run over it.

Some newspaper writer of a New York daily has made fun of the annual conflagrations which sweep the pineries of New Jersey, saying that one would think that by this time they were all swept out of existence.

As far as really useful and valuable wood growth is concerned, they certainly are mostly if not entirely gone; but nature is so eager to repair the damage that even these barrens are in a few years clothed with a mixed growth of young trees and brush, and it is this that furnishes food for the next fire.

So fierce are these fires at times, when the seasons are dry, that even the cedar swamps do not escape from the conflagration. The soil itself is burned out in these, and not only the original growth is lost, but all chance for recuperation is destroyed as well.

I do not need to give you any details of the condition of your forest soil areas, nor an account of the scourge of fire which is a disgrace to any State claiming civilized conditions. You know it all; it has been talked about until even the ancient mariner would be tired of it, and would feel inclined to stop the story by removing the cause. I take it that talk has had its day and that action is in order.

Supposing that your legislators have

come to a conception of the moral obligation of the community to protect all property, even forest property, against loss and damage, and that it is their duty to maintain and secure favorable conditions for the present as well as the future, what legislation should they enact?

Three years ago, I believe, a sum of money was appropriated to the State Geological Survey for the purpose of reporting on the forest conditions of the State, of studying the influence of its forest areas on water conditions and climate, and to furnish in general the basis for forest legislation.

It is perfectly proper and wise to make such preliminary studies before acting, for "ignorant legislation is criminal," and the Jersey Legislature showed singular wisdom in entrusting these studies, not to a commission of ever so respectable, intelligent and patriotic citizens, as other States have done, but to an existing bureau of technically educated men, who were equipped to do this work thoroughly and authoritatively. These studies, I believe, are not yet finished, and should go on, if only for the educational value that comes from them.

But sufficient knowledge, I believe, is presented in the two or three progress reports furnished to warrant some definite legislation in the direction of active measures. In the first place, it should be a recognized duty of the State to protect all forest property from incendiarism.

If that is efficiently done, forestry, *i. e.*, the systematic growing of wood crops, becomes possible; so long as the safety of a crop which takes from 50 to 100 and more years to mature is hazarded to such an extent that at any time the accumulation of many years wood growth may go up in smoke, there is no incentive to apply thought, money and patience to its production.

There has been quite a good fire law on your statute books for more than 100 years, which fact might teach our legislators that laws on paper are useless unless machinery is provided to carry it into effect, and it is not sufficient to designate the machinery that is to do the

work, but it takes steam and an engineer to run it.

So much of our legislation becomes ineffective, falls into "innocuous dissuade," because the engineer to run the machine is not provided; somehow the perpetuum mobile is not yet invented; nothing runs by itself.

It is a curious fact that we in the United States, who are so proud of our business capacity, have so rarely succeeded in getting our public business done satisfactorily or efficiently. The reason undoubtedly is that, first, we do not fully appreciate the moral obligations of governments, and then, because we entrust it to cheap men—whose smaller or larger pay is in the end not cheap at all.

When England recognized the need of action in her Indian forest areas, they imported a man from the country where forestry was best understood, from Germany, paid him a salary of \$10,000 a year for ten years, with a pension of the full salary when he retired. The result has been that a most efficient fire protection not only, but a most magnificent forestry system has been inaugurated, which produces an ever increasing net revenue, amounting now to more than 3½ millions annually.

Even Japan knew how to secure efficiency, importing similarly and paying generously for a German forester to organize her Forestry Department and Forest School, giving him a *carte blanche* as to how to do it.

I do not think that you need to go out of this country or out of your State to secure efficient service. To organize a forest fire service at least good administrative material undoubtedly exists among you. But you may set it down as an axiom that in government matters, just as in private matters, success is secured only by adequate expenditure—good work costs, poor work is expensive.

So necessary is it to have some one man especially charged with the execution of such a fire law, that one might say providing the engineer to run the machine is almost of more importance

than the machine and the law. Experience has certainly proved the correctness of this position, for in spite of the machinery which your law provides, constituting justices of the peace, constables and overseers of highways fire wardens, with the right to order out the necessary help, etc.; in spite of the fact that the law makes railroad companies responsible for fires occasioned by them, and requires them to provide spark-arresters for their locomotives, these provisions remain nugatory for lack of some central authority charged with looking to the execution of the laws.

That the public morality of the smaller communities is not sufficient to trust them to do their duty voluntarily may be suspected, inasmuch as the law enacted in 1892, which authorizes any township committee of the third and fourth-class counties to employ persons for putting out fires and appoint fire marshals and deputies, and charge the cost in the tax rate, has probably rarely, if ever, found application.

The first necessity, then, is the appointment of an energetic Forest Commissioner, well fitted for the position, well paid and suitably provided, charged with the forestry interests of the State in all their bearings, but especially charged to organize and enforce a forest fire service.

How such a service should be organized depends upon local conditions; methods which are sufficient in the hardwood section of Northwestern New Jersey would fail to produce results in the southeastern pineries: while voluntary organization of local agencies may suffice there, here paid service, during the dangerous months at least, and enforced cooperation of the owners would be necessary, and possibly the opening of fire lanes by which the territory is segregated into blocks, within which a fire may be controlled.

The details of such organization should be left to the Forest Commissioner, who must be a first-class organizer, independent of all political influences, and not a mere appendage to an existing department.

The loss from fires in your State may, according to the statements of your Geological Survey, be placed at \$1,000,000 per year, an amount which would nearly pay the entire taxes of the State. Would it not be wisdom to spend say 2 per cent. of this annual loss in trying to prevent it? With sufficient means and organization the loss can certainly be reduced to a minimum, and every owner of forest land will willingly be taxed the small contribution, provided he is assured that the protection will be efficient. It can be done. Do it!

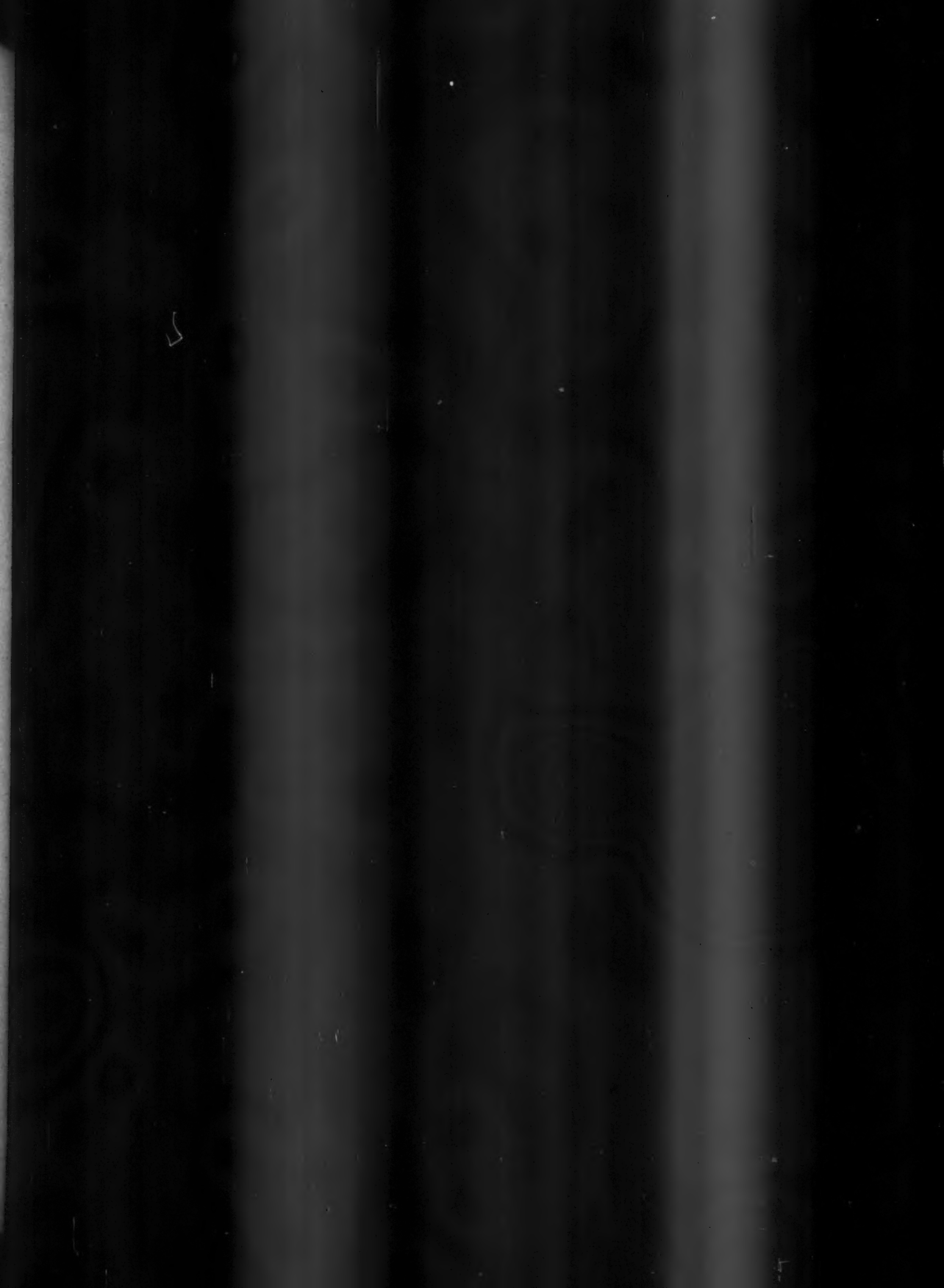
When the forest owners are sure that fire lanes along railroad lines and through dangerous districts will be kept up to the mark, that active and vigilant rangers are looking out for incipient fires, and for those who are responsible for their setting, when they have become persuaded that their forest property enjoys as good protection as their house property, they will be found willing to spend some time, some thought and some money on its improvement.

Finally, however, the State itself will have to own and put in proper condition many of the waste tracts which are a menace to adjoining property. As the State of Massachusetts has begun to recover the sand wastes of its Province lands by forest planting, so your State will have to arrest the progress of the sand dunes.

But these questions it will be time enough to discuss during the next century, when the full conceptions of the duties of the State will have pervaded our people. Let the present century see the first most necessary step, without which there can be no progress in rational forest culture and use of soils—an efficient protection against fires.

Forestry associations have been formed in New York, Pennsylvania, New Jersey, Colorado, Ohio, Kentucky, Texas, Minnesota, South Carolina, North Dakota, Wisconsin, Utah, Washington and Connecticut.

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